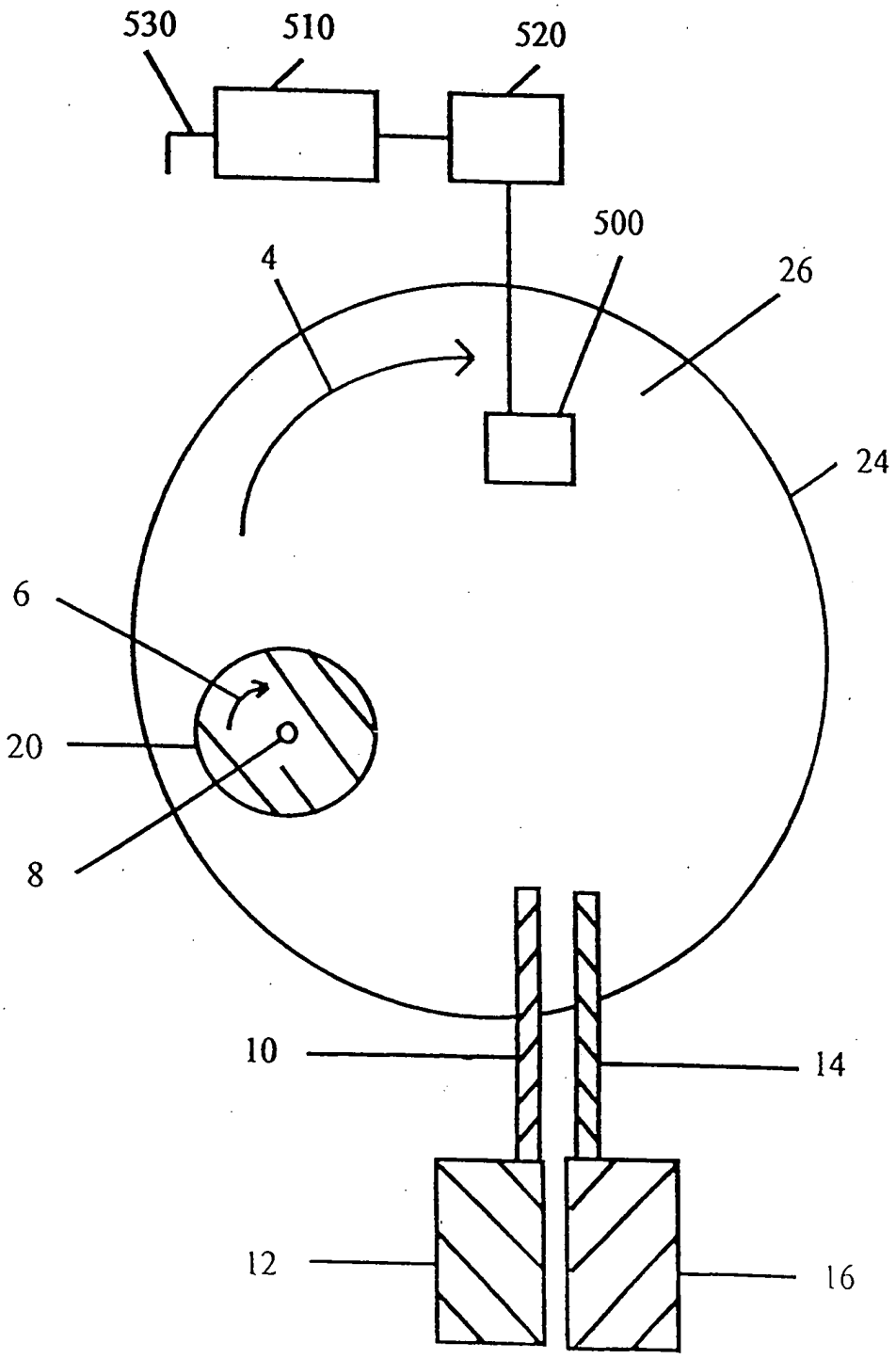


Figure 1

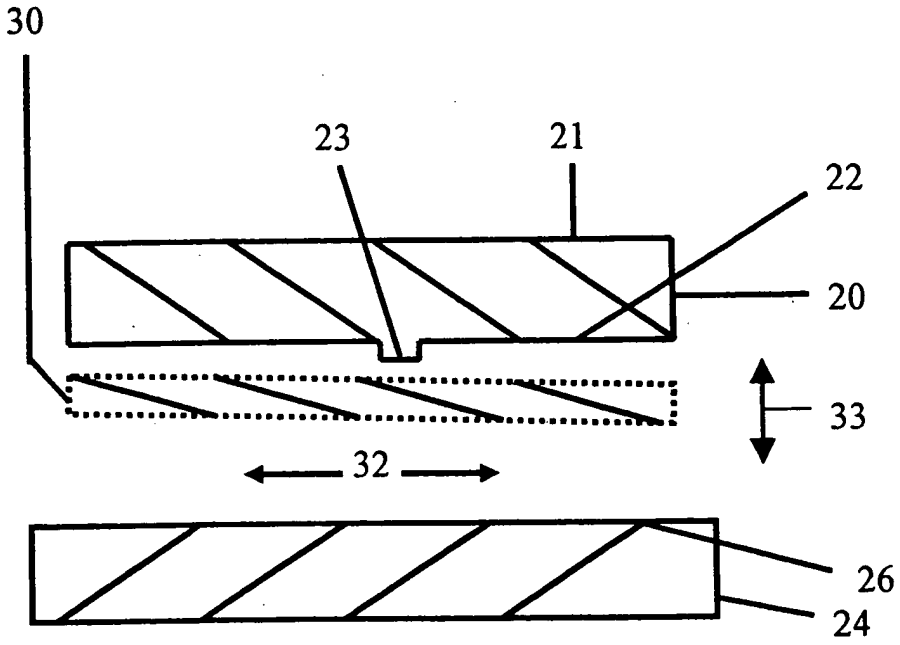


Figure 2

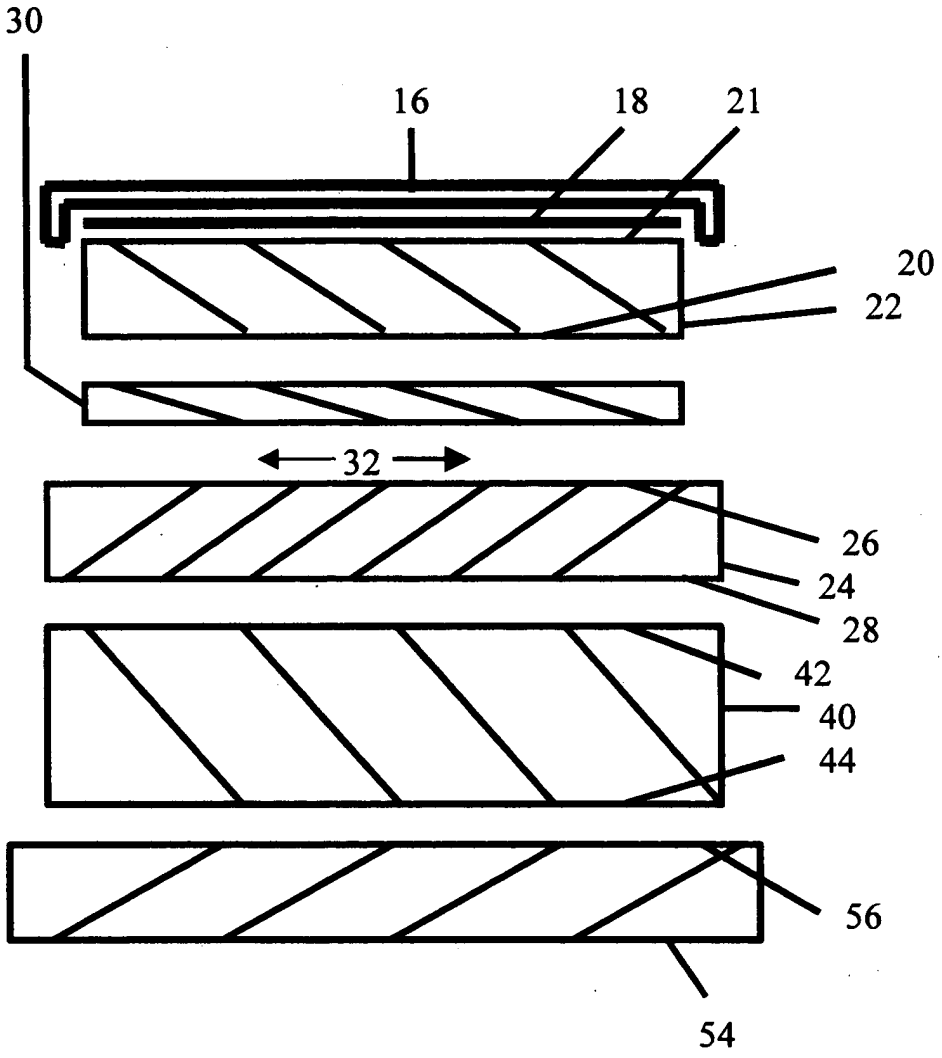


Figure 3

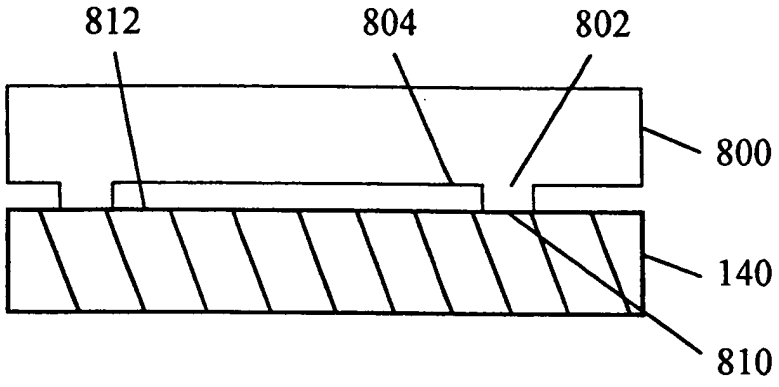


Fig. 4a

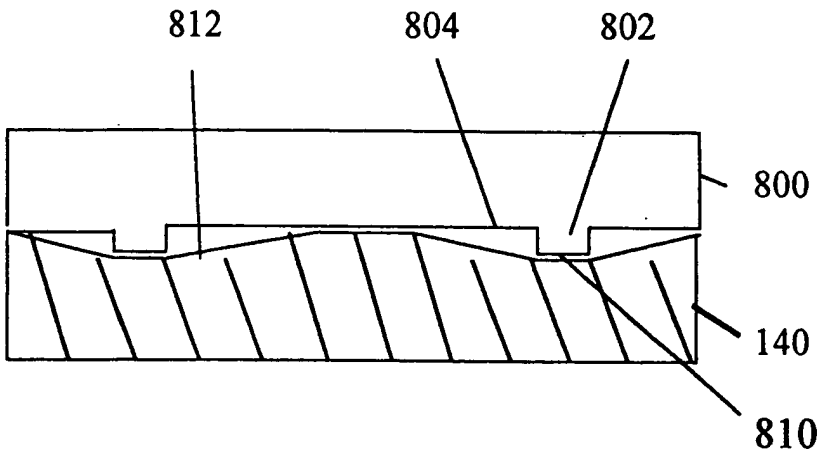


Fig. 4b

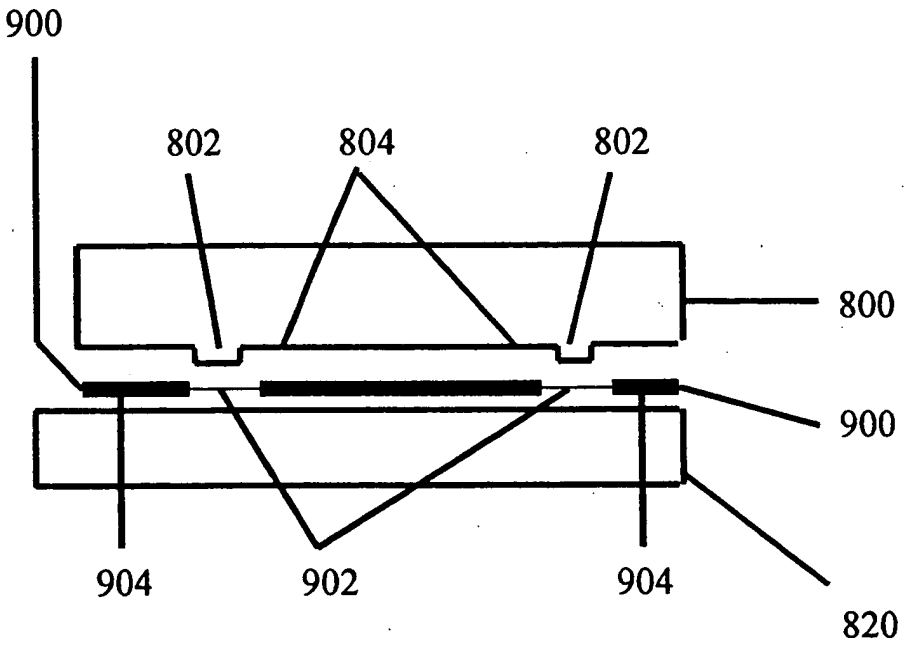


Figure 5

Figure 6

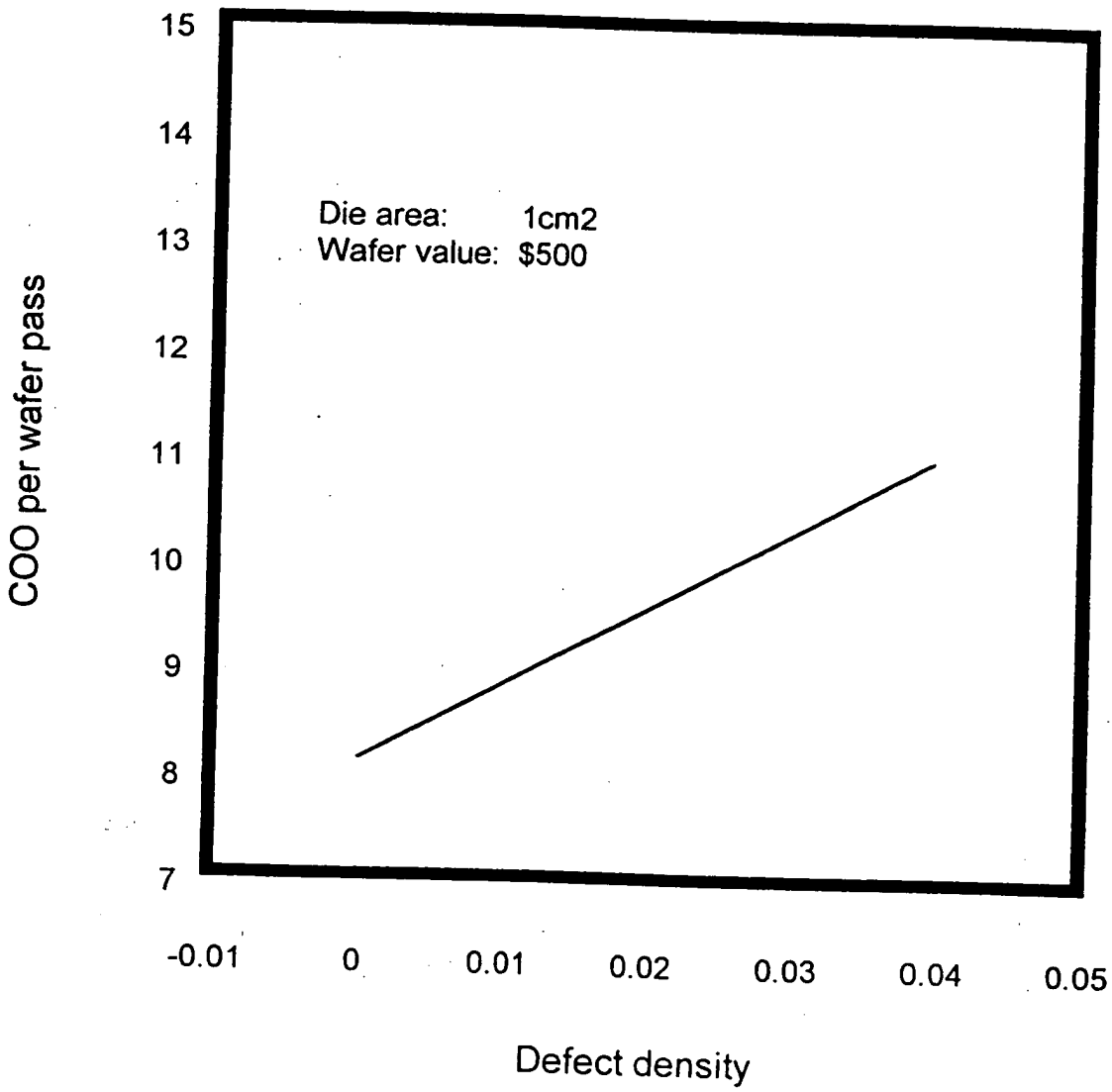

15
14
13
12
11
10
9
8
7
Die area: 1cm2
Wafer value: $500
COO per wafer pass
-0.01
0
0.01
0.02
0.03
0.04
0.05
Defect density

Figure 7

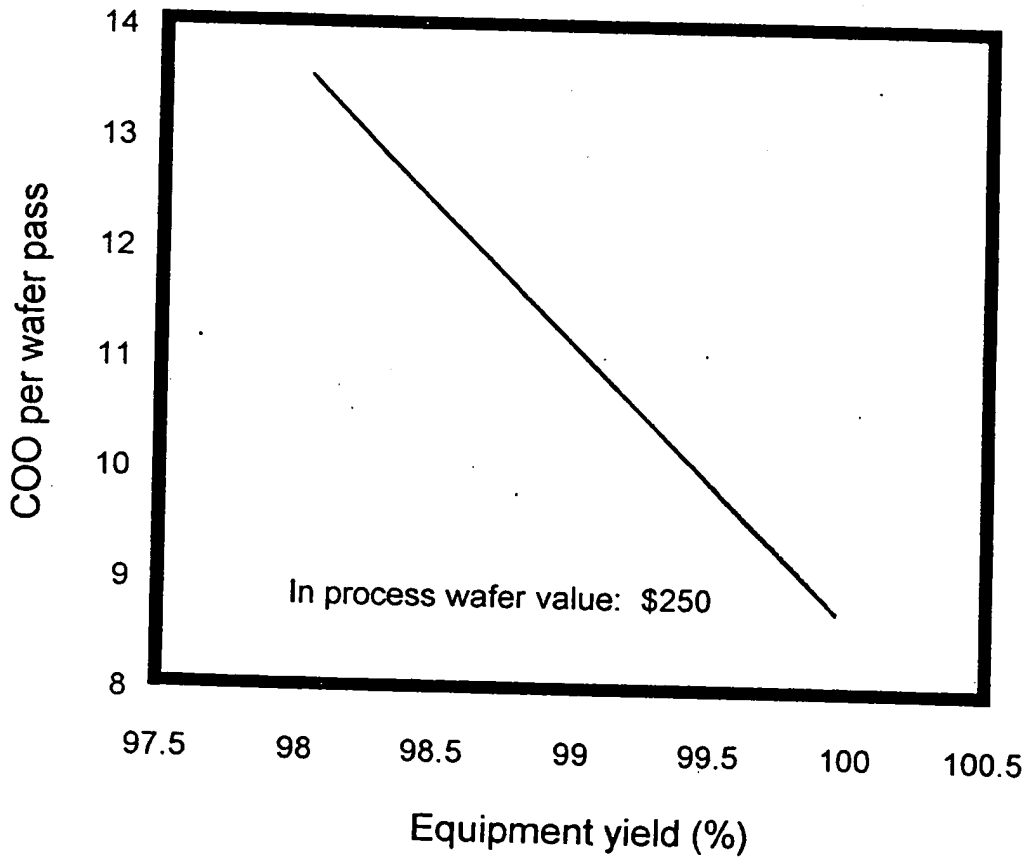

14
13
12
11
10
9
8
COO per wafer pass
In process wafer value: $250
97.5
98
98.5
99
99.5
100
100.5
Equipment yield (%)

Figure 8

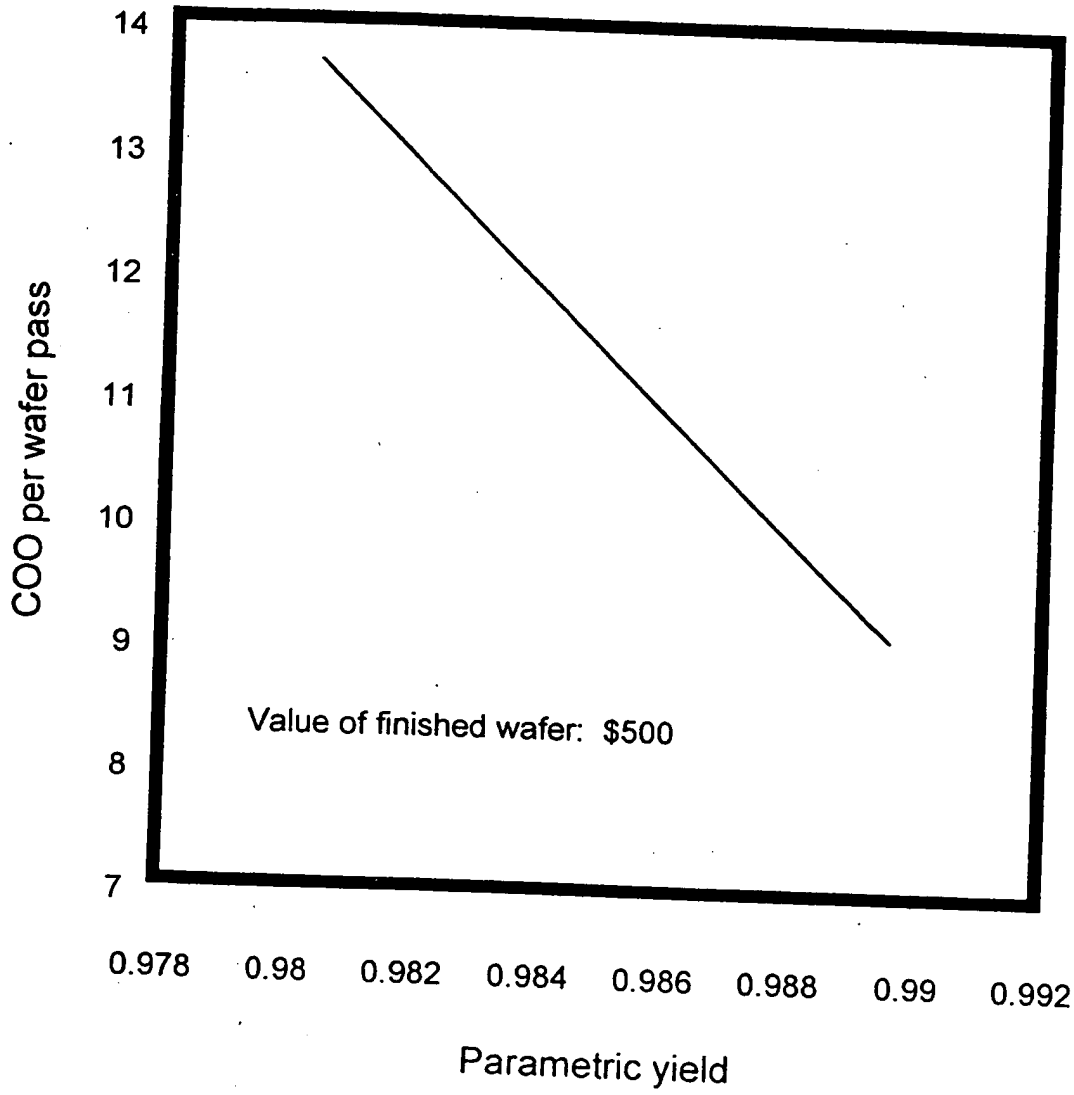
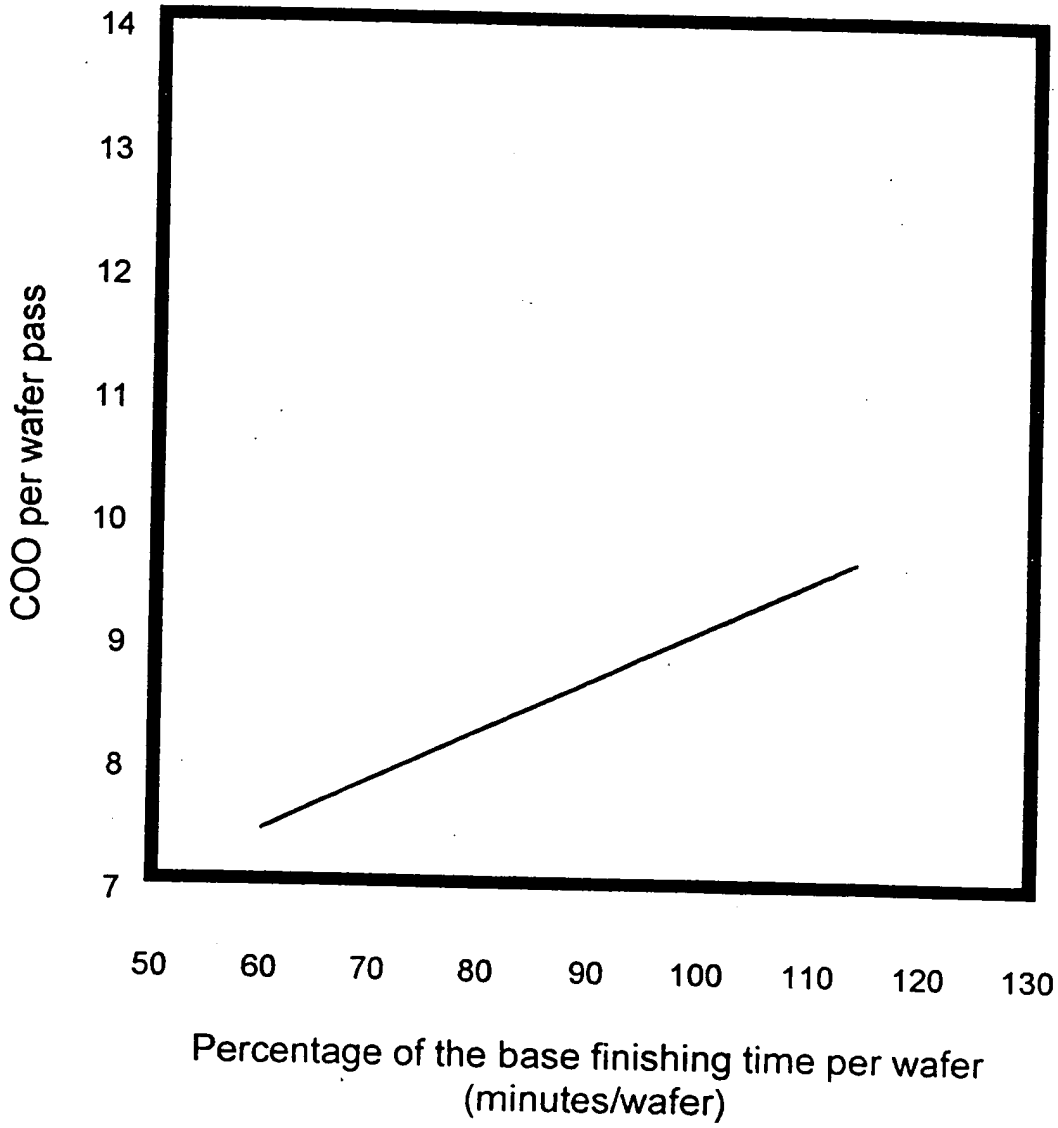

14
13
12
11
10
9
8
7
COO per wafer pass
Value of finished wafer: $500
0.978
0.98
0.982
0.984
0.986
0.988
0.99
0.992
Parametric yield

Figure 9


14
13
12
11
10
9
8
7
COO per wafer pass
50
60
70
80
90
100
110
120
130
Percentage of the base finishing time per wafer
(minutes/wafer)

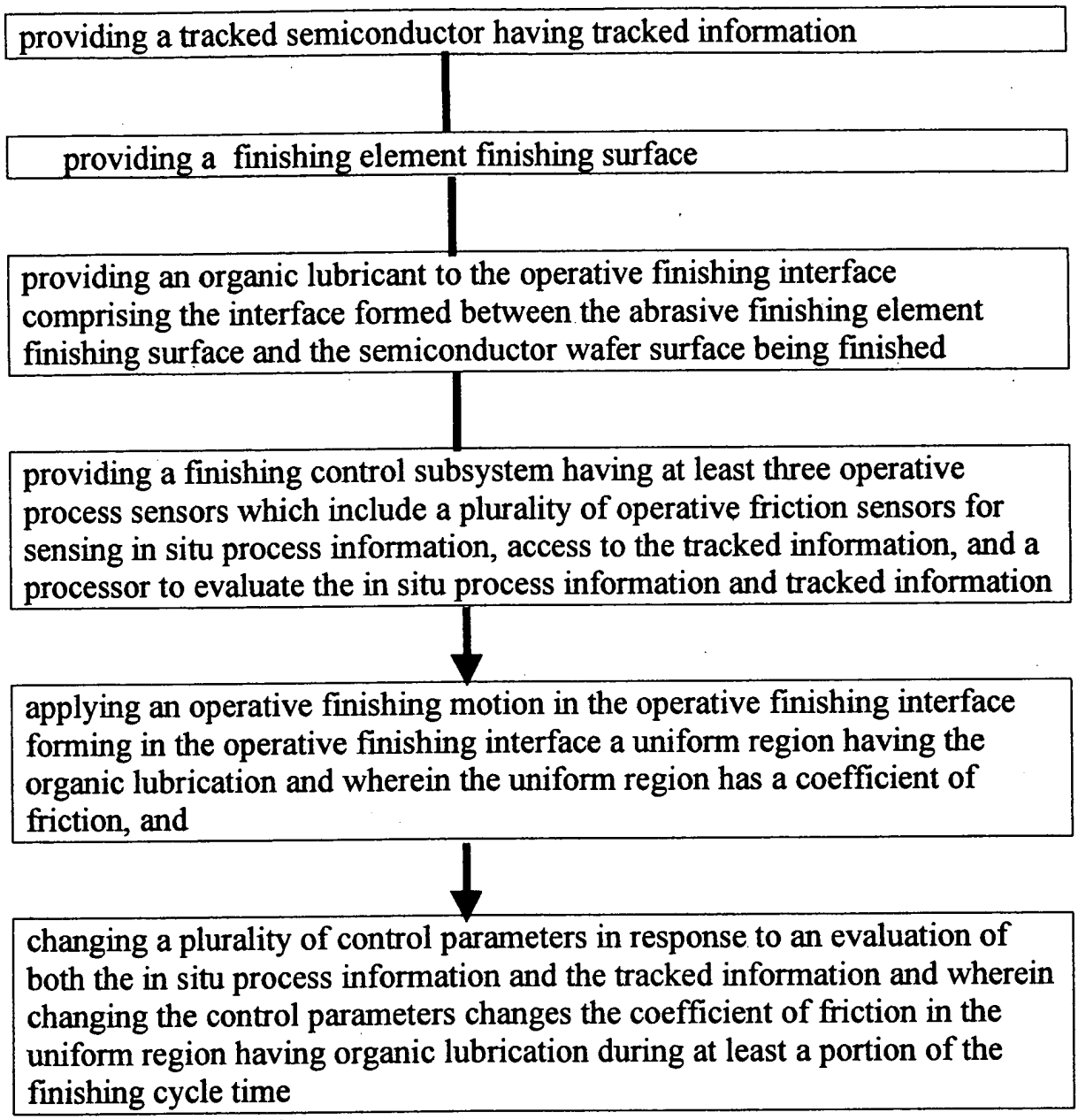

providing a tracked semiconductor having tracked information
providing a finishing element finishing surface
providing an organic lubricant to the operative finishing interface comprising the interface formed between the abrasive finishing element finishing surface and the semiconductor wafer surface being finished
providing a finishing control subsystem having at least three operative process sensors which include a plurality of operative friction sensors for sensing in situ process information, access to the tracked information, and a processor to evaluate the in situ process information and tracked information
applying an operative finishing motion in the operative finishing interface forming in the operative finishing interface a uniform region having the organic lubrication and wherein the uniform region has a coefficient of friction, and
changing a plurality of control parameters in response to an evaluation of both the in situ process information and the tracked information and wherein changing the control parameters changes the coefficient of friction in the uniform region having organic lubrication during at least a portion of the finishing cycle time

Figure 10

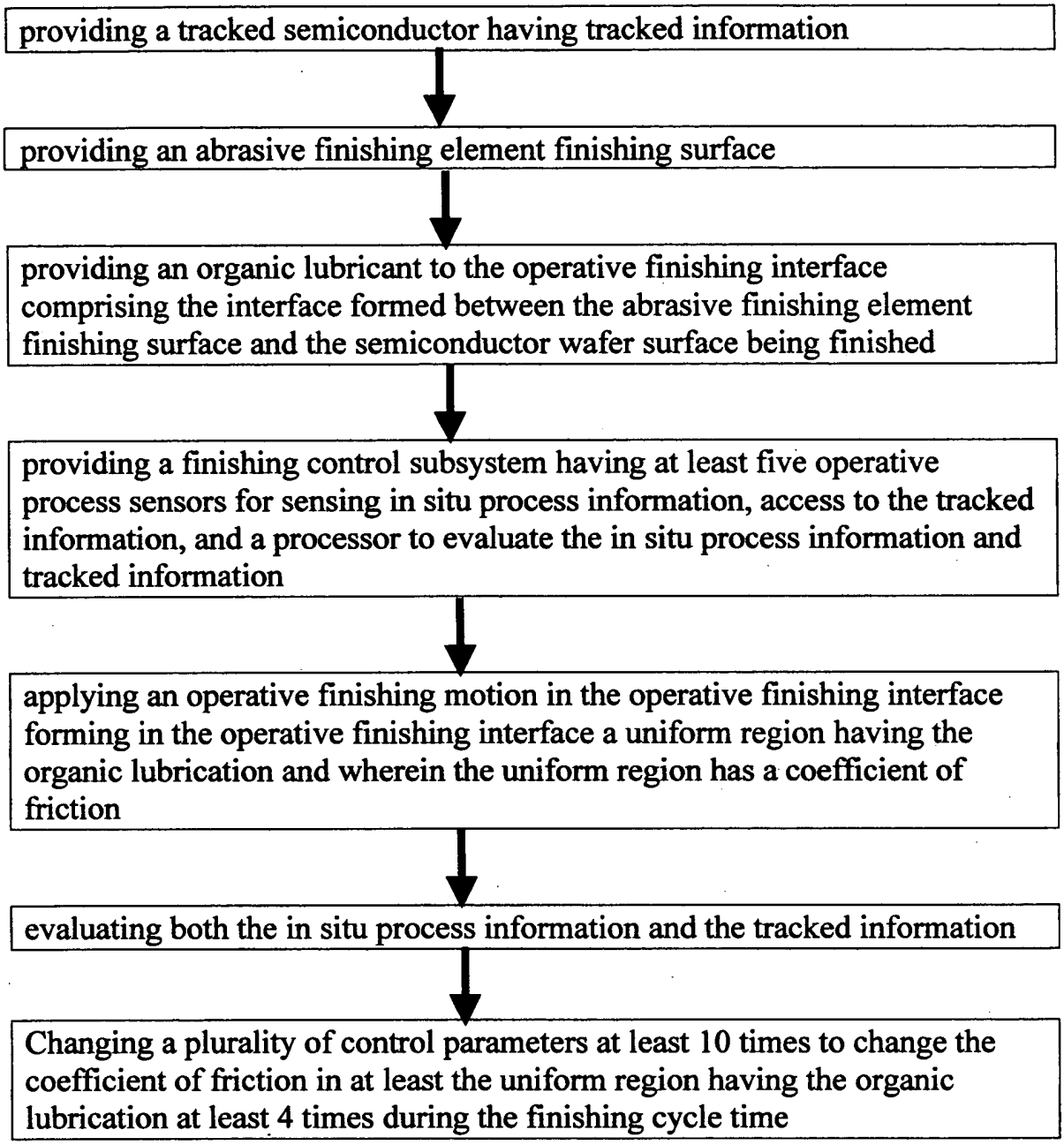

providing a tracked semiconductor having tracked information
providing an abrasive finishing element finishing surface
providing an organic lubricant to the operative finishing interface comprising the interface formed between the abrasive finishing element finishing surface and the semiconductor wafer surface being finished
providing a finishing control subsystem having at least five operative process sensors for sensing in situ process information, access to the tracked information, and a processor to evaluate the in situ process information and tracked information
applying an operative finishing motion in the operative finishing interface forming in the operative finishing interface a uniform region having the organic lubrication and wherein the uniform region has a coefficient of friction
evaluating both the in situ process information and the tracked information
Changing a plurality of control parameters at least 10 times to change the coefficient of friction in at least the uniform region having the organic lubrication at least 4 times during the finishing cycle time

Figure 11

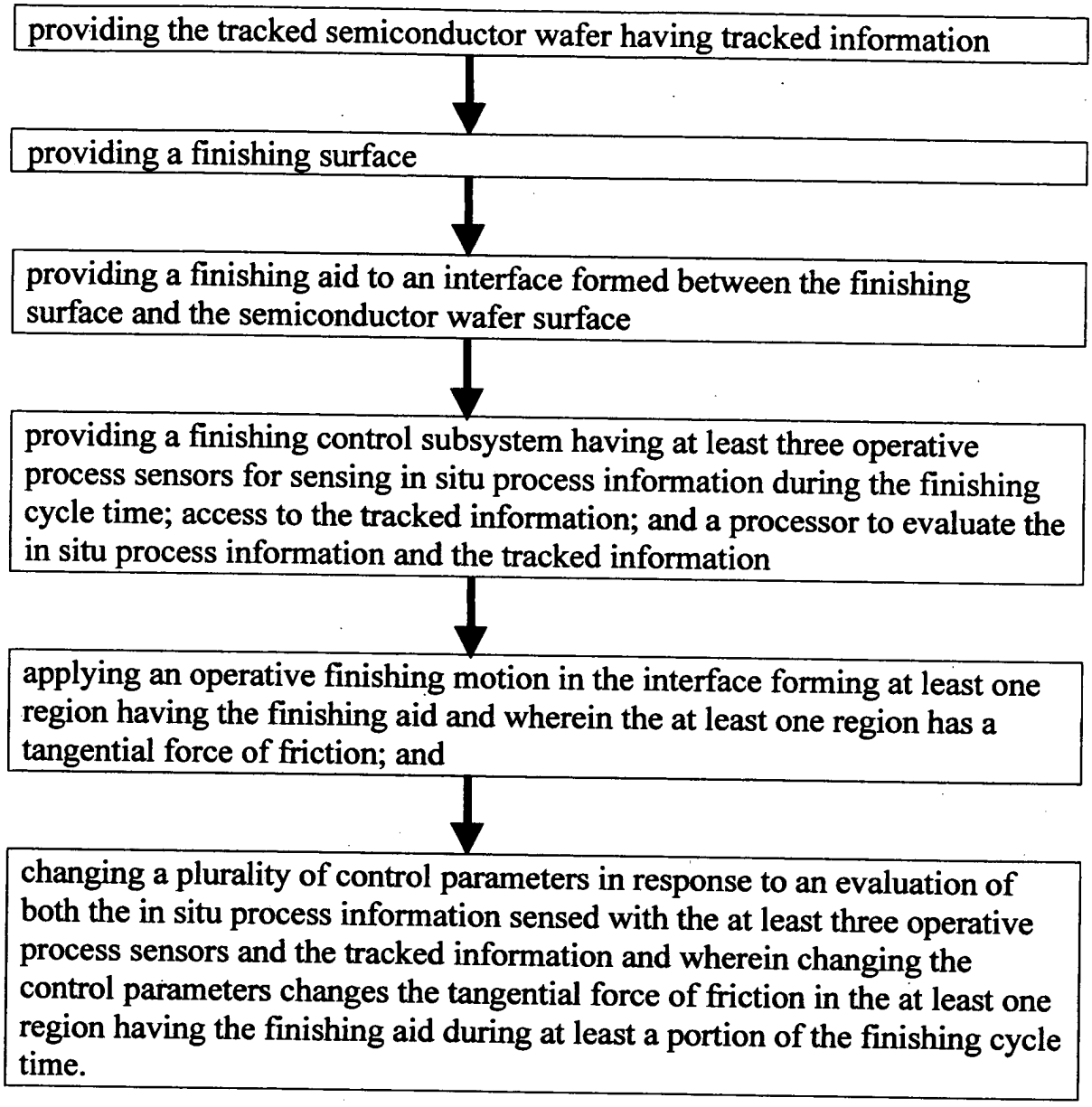

providing the tracked semiconductor wafer having tracked information
providing a finishing surface
providing a finishing aid to an interface formed between the finishing surface and the semiconductor wafer surface
providing a finishing control subsystem having at least three operative process sensors for sensing in situ process information during the finishing cycle time; access to the tracked information; and a processor to evaluate the in situ process information and the tracked information
applying an operative finishing motion in the interface forming at least one region having the finishing aid and wherein the at least one region has a tangential force of friction; and
changing a plurality of control parameters in response to an evaluation of both the in situ process information sensed with the at least three operative process sensors and the tracked information and wherein changing the control parameters changes the tangential force of friction in the at least one region having the finishing aid during at least a portion of the finishing cycle time.

Figure 12

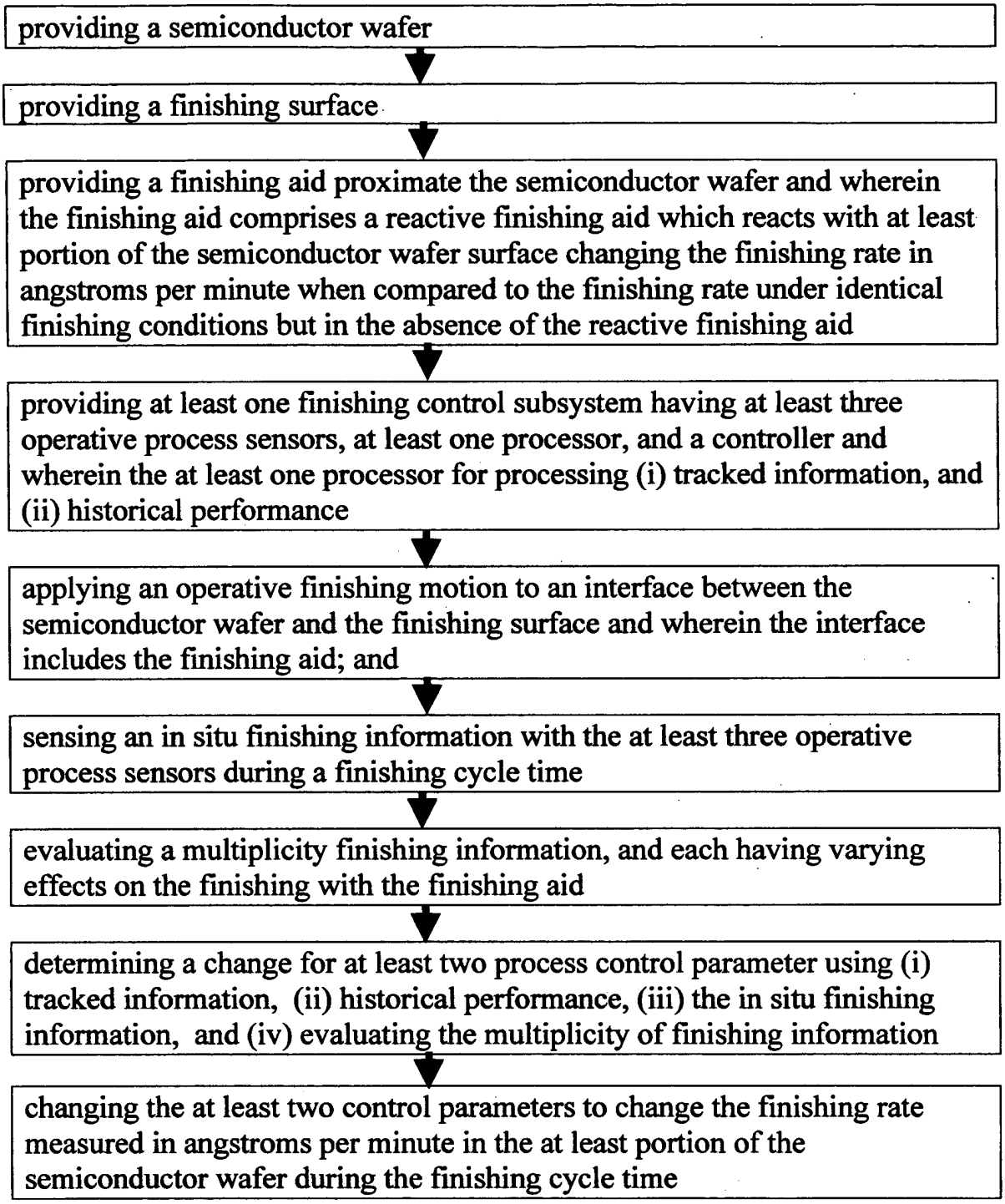

providing a semiconductor wafer
providing a finishing surface
providing a finishing aid proximate the semiconductor wafer and wherein the finishing aid comprises a reactive finishing aid which reacts with at least portion of the semiconductor wafer surface changing the finishing rate in angstroms per minute when compared to the finishing rate under identical finishing conditions but in the absence of the reactive finishing aid
providing at least one finishing control subsystem having at least three operative process sensors, at least one processor, and a controller and wherein the at least one processor for processing (i) tracked information, and (ii) historical performance
applying an operative finishing motion to an interface between the semiconductor wafer and the finishing surface and wherein the interface includes the finishing aid; and
sensing an in situ finishing information with the at least three operative process sensors during a finishing cycle time
evaluating a multiplicity finishing information, and each having varying effects on the finishing with the finishing aid
determining a change for at least two process control parameter using (i) tracked information, (ii) historical performance, (iii) the in situ finishing information, and (iv) evaluating the multiplicity of finishing information
changing the at least two control parameters to change the finishing rate measured in angstroms per minute in the at least portion of the semiconductor wafer during the finishing cycle time

Figure 13

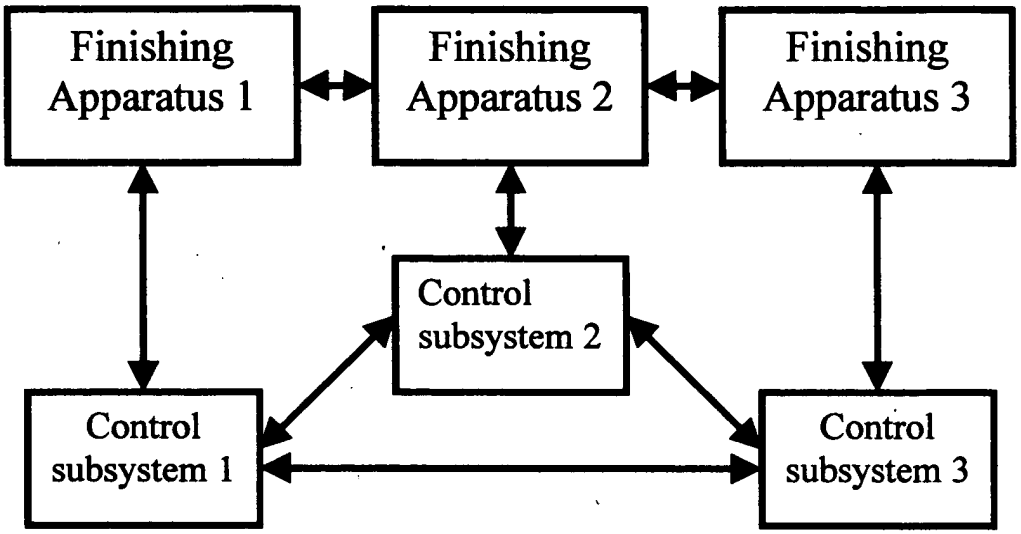


Figure 14a

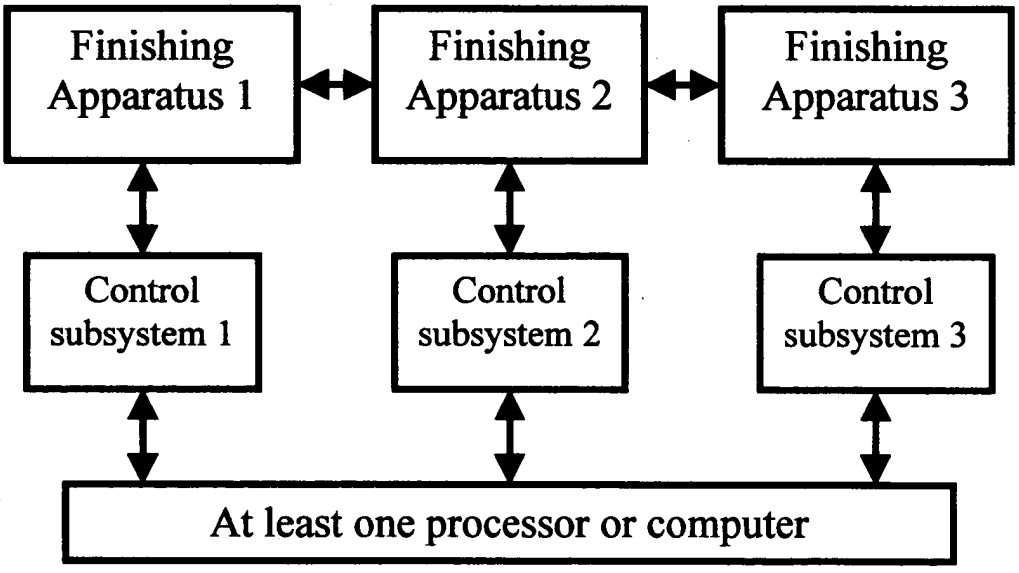


Figure 14b